

Special Report: Clothing trends, developments

C3975-2

PULP & PAPER

August 1990

**World market
pulp supply,
demand • 51, 120**

**Miramichi's new
paper machine,
recovery boiler • 112**

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AUGUST

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For this issue's focus on market pulp, we gave our photographer free rein. By projecting colored lights across a sheet of market pulp, he was able to reveal its texture in detail. (White Gold semibleached news kraft courtesy of Pope & Talbot, Halsey, Ore.)

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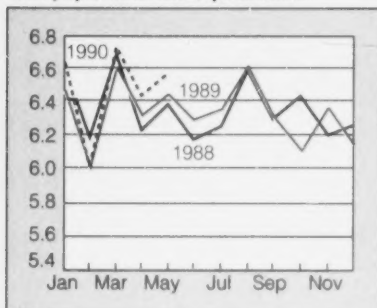
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U.S. paper and board production



U.S. production of paper and paperboard totaled 6.6 million tons in May, according to the American Paper Institute, an increase of 2.2% over the same month last year. The seasonally adjusted rate of production climbed to 77.7 million tpy, outpacing last year's record production by 1.4%. The paper sector accounted for most of the increase, with production 2.8% ahead of last year. Paperboard production was up a modest 0.5%.

Among major grades, newsprint led the way with a 9.1% increase, which came despite flat consumption patterns and relatively low publishers' inventories. Shipments of printing and writing paper climbed 2.8% over January-May period on the strength of a 3.5% gain for coated grades. Containerboard production posted a 1.0% increase, largely due to a 0.9% gain in unbleached kraft linerboard, while boxboard production was down 0.2% through May. Paperboard production for export was very strong, up 8.2% for containerboard and 21.1% for boxboard.

Canadian newsprint shipments totaled 861,000 metric tons in May, an increase of 2.3% over May 1989. Woodpulp shipments dropped to 615,000 tons, down 11.0%. Newsprint mills operated at 97% of capacity and pulp mills at 87%.

	Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
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PAPER & PAPERBOARD PRODUCTION¹

Newsprint	May	545	8.1	6,460	9.1
Uncoated groundwood (s)	May	144	-4.6	1,794	3.5
Coated paper (s)	May	621	7.1	7,257	3.5
Uncoated free-sheet (s)	May	938	0.0	11,562	2.3
Other printing/writing	May	131	4.0	1,615	5.9
Total packaging and other paper (s)	May	406	5.7	4,665	-4.5
Tissue	May	494	4.2	5,726	2.4
Total paper	May	3,279	3.9	39,079	2.8
Unbleached kraft paperboard	May	1,683	0.1	19,796	1.7
Semichemical medium	May	499	6.6	5,688	-0.3
Bleached paperboard	May	366	-4.2	4,491	1.2
Recycled paperboard	May	741	0.7	8,794	-1.5
Total paperboard	May	3,289	0.7	38,769	0.6

Total U.S. paper and paperboard output	May	6,568	2.2	77,849	1.7
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PULP, WASTEPAPER & FIBER²

Total U.S. woodpulp production	Apr.	5,253	1.2	62,976	1.2
Market pulp production	Apr.	675	-6.0	8,537	-3.6
Wastepaper consumption at paper/board mills	Apr.	1,739	11.8	20,783	5.8
Pulpwood consumption (cords)	Apr.	8,260	2.7	99,786	2.6

CONVERTED PRODUCTS STATISTICS³

Corrugated box shipments (billion ft ²)	May	27.219	1.1	132.309*	0.9
Containerboard inventories at U.S. box plants and mills	May 1	2,593	1.1		

INTERNATIONAL TRADE²

U.S. paper imports (including products)	Apr.	1,131	8.2	13,285	4.2
Imports of Canadian newsprint	Apr.	723	8.4	8,484*	3.7
U.S. paper exports (including products)	Apr.	615	25.8	6,879	11.4
Exports of unbleached kraft linerboard	Apr.	255	52.7	2,683	18.6
Exports of woodpulp	Apr.	538	2.5	5,838	-7.8
Norscan pulp inventories ⁴	May 31	1,442	70.9		
Norscan pulp operating rates ⁴	May	86%	85%	85%	89%

CANADIAN STATISTICS⁵ (reported in metric tons)

Total newsprint shipments	May	861	2.3	3,934*	1.0
Operating rates	May	97%	96%	94%	97%
Inventories held by U.S. consumers	May 31	1,299	0.9		
Other paper/board shipments	May	637	5.8	3,064	7.1
Woodpulp shipments (export only)	May	615	-11.0	3,156	-9.1
Operating rates	May	87%	91%	88%	95%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Corrugating medium: Slow demand, higher capacity growth make for competitive market

Grade structure: Corrugating medium, the middle fluting material used in corrugated containers, is made from both semichemical pulp and recycled fiber. In 1989, 76% of corrugating medium was semichemical and 24% was recycled medium. However, semichemical medium may contain 20% or more recycled fiber. Basis weights for corrugating medium are 22, 26, 33, 36, and 40 lb/1,000 ft².

Standard sheet weight is 26 lb, which accounts for about 77% of production (although heavier weights have been growing in popularity). Recycled medium for equivalent uses is normally produced in slightly higher weights.

Production/capacity. U.S. production of corrugating medium declined by 0.1% in 1989 to 7.5 million tons from the previous year. Semichemical medium production rose 0.5%, while recycled medium output declined 2.1%. The weakness reflected slower growth in U.S. box shipments, which were up 1.6% in 1989.

Box demand is expected to slow even further this year, with shipments forecast to rise 1.3%. Corrugating medium production is expected to increase by about the same amount to 7.6 million tons. Semichemical medium production is expected to be relatively flat, while recycled medium production should increase by almost 5%.

The higher growth for recycled medium reflects additional capacity, which is expected to increase 7.7% this year, according to the American Paper Institute. The Pratt Group started up a new 70,000-tpy recycled medium mill in Hartford City, Ind., earlier this year, and incremental expansion projects are being completed at a number of mills (including Stone Container Corp. at Uncasville, Conn., and Inland Container Corp. at Newport, Ind.).

Semichemical medium capacity, on the other hand, is expected to rise only 1.4% this year (and this probably does not include the closure of the 100,000-tpy Clinch River Corp. mill in Harriman, Tenn., in January). The loss of this capacity, however, is being offset by rebuilds that will be completed

this year at a number of semichemical medium mills (including Inland at New Johnsonville, Tenn., and Willamette Inc. at Hawesville, Ky.) Operating rates for semichemical mills are expected to average close to 95% this year, while recycled mills will operate at only 85%.

Prices. The combination of sluggish demand, relatively high capacity growth for recycled medium (combined with lower wastepaper costs), and increased imports has led to highly competitive market conditions. Imports of medium from Canada have been running at a rate close to 160,000 short tpy this year, up 12% from a year ago, according to Canadian Pulp & Paper Assn. statistics. Erosion in box prices has squeezed margins of converters and added to pressure on containerboard prices.

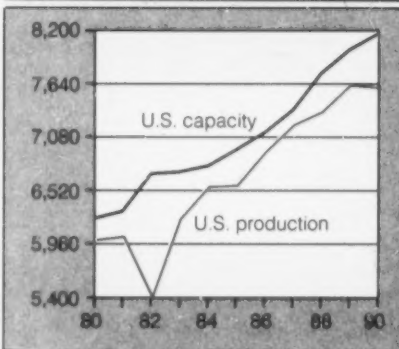
After reaching close to \$400/short ton in second-quarter 1988, the price of semichemical medium began to erode and, by this summer, had dropped to about \$310 to \$330 in parts of the eastern U.S. with even lower prices reported, particularly for recycled medium.

Year-end transaction price history for 26-lb semichemical medium in the East is as follows: 1985, \$240; 1986, \$290-300; 1987, \$350-360; 1988, \$380-390; 1989, \$360-370.

Outlook. Some strengthening in box shipments should lead to a pickup in the corrugating medium market in 1991. Box shipments are expected to rise about 2.6%—based on similar growth in U.S. industrial production vs this year's slower 1.1% growth. This would result in about a 2.5% increase in total corrugating medium production to 7.6 million tons in 1991.

The most rapid growth in production should be in recycled corrugating medium because of higher capacity growth. Operating rates for semichemical medium mills are forecast to average 95%, while recycled medium producers run at about 87% of capacity in next year. This may be enough to permit some firming in prices, particularly if wastepaper costs begin to increase and corrugated box prices begin to rise.

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1989	1990e	1991e
Production			
Semichemical	5,691	5,700	5,815
Recycled	1,785	1,870	1,945
Total	7,476	7,570	7,760
Capacity ¹			
Semichemical	5,917	6,003	6,010
Recycled	2,040	2,197	2,236
Utilization rates			
Semichemical	96.2%	95.0%	96.8%
Recycled	87.5%	85.1%	87.0%
Imports	143	160	165
Exports	137	132	145
Apparent U.S. consumption	7,455	7,598	7,780
lb/capita	59.66	55.28	56.05
GNP ratio	1.80	1.80	1.80

e = Pulp & Paper 1990 estimate.

1. American Paper Institute capacity data.

2. 1,000 tons/\$ billion real GNP.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity			Market share (%)
	Semi-chem	Recycled	Total	
1. G-P	1,275 ¹	—	1,275	19.5%
2. Stone	685	235	920	11.2
3. Weyco	700	—	700	8.5
4. Smurfit	120	405	525	6.4
5. Inland	240	270	510	6.2
6. Mead	390	—	390	4.8
7. IP	370	—	370	4.5
8. Willamette	170	160	330	4.0
9. PCA	280	—	280	3.4
10. Va. Fibre	265	—	265	3.2

Market share of top five companies:

47.9%

Market share of top ten companies:

67.9%

Total U.S. capacity (1990):

8,200

1. Includes Great Northern Nekoosa acquired this year; G-P then announced plans to sell off mills with semichemical medium capacity at Tomahawk, Wis. (445,000 tpy) and Toledo, Ore. (192,000). Also included in the G-P total is 50% stake in a 170,000-tpy machine at Sonoco Products Co.'s Hartsville, S.C., mill.

Recycled newsprint projects proliferate; barely a manufacturer not eyeing one

Announcements and reports winding their way through the industry grapevine in recent months have tallied up a number of companies that are looking at installing deinking equipment at existing mills. Some are even considering greenfield projects. Rarely a week goes by that a new proposal doesn't sprout. And for the first time, a U.S. directory paper manufacturer has indicated it will use recycled fiber. Recycled directory paper is not made in North America currently.

Daishowa Forest Products Ltd. indicated in late June that it would add a 300-metric-tpd (110,000 tpy) deinking plant at its 452,000-tpy newsprint and directory paper mill in Quebec City, Que. Construction will begin in April 1991 and be completed in time for the plant to start up in first-quarter 1992. The C\$56-million facility is expected to use 120,000-tpy of old newspapers (ONP) and used magazine

stock. Earlier this year, Daishowa said that it would expand and upgrade its Quebec City boxboard mill at a cost of C\$27 million. Combined, the boxboard and newsprint/directory paper mill investments boost Daishowa's Canadian-based wastepaper consumption to 170,000 tpy, making it a chief user of recycled fiber in Canada, the company indicated.

The parent of Daishowa divisions in North America, Daishowa Paper Manufacturing Co. of Japan, earlier indicated interest in installing deinking equipment at its Port Angeles, Wash., directory paper mill. Last year, the company had postponed plans at Port Angeles to add two machines, one producing newsprint and another producing directory paper.

Champion International Corp. also announced that it was going ahead with an \$85-million deinking plant at its 429,000-metric-tpy Sheldon, Tex-

as, newsprint mill. Construction of the 130,000-tpy washing and flotation deinking plant is scheduled to start in late 1990 and be completed by late 1992. It will make about 130,000 tpy of recycled fiber to supply about 20% of the furnish for the mill's three newsprint machines. Simons Eastern Consultants is the engineering contractor. A Champion spokesman said that the company was negotiating with major municipalities, such as Houston, Fort Worth, and Dallas, to set up collection systems that could supply about 160,000 tpy of ONP and used magazines to the mill.

Alabama River Newsprint Co. and Inland Empire Paper Co. in mid-June announced intentions to install deinking facilities. Both projects are expected to be completed in late 1991. Neither mill uses recycled fiber now, but that is where the similarity ends. Alabama River Newsprint is a brand

North American deinked newsprint projects, 1990-94.

Company/mill site	Startup	Capacity ¹ (metric tpy)	Recycled content (%)	Recycled furnish (metric tpy)	Grades
Definite					
Alabama River Newsprint, Claiborne, Ala.	End 1991	110,000 ³	40%	125,000	ONP and OMG
Atlantic Packaging, Whitby, Ont.	Jan. 1990	135,000 ²	100%	160,000	ONP and OMG
Augusta Newsprint, Augusta, Ga.	Late 1990	90,000 ³	var.	100,000+	ONP and OMG
Bowater, Calhoun, Tenn.	Dec. 1991	109,500 ³	var.	130,000	ONP and OMG
Canadian Pacific, Thunder Bay, Ont.	Mid-1991	100,000 ³	var.	120,000	ONP and OMG
Gatineau, Que.	Mid-1991	182,500 ³	var.	215,000	ONP and OMG
Champion, Sheldon, Texas	Late 1992	130,000 ³	20	160,000	ONP and OMG
Daishowa Forest, Quebec City, Que.	1992	110,000 ³	n.a.	120,000	ONP and OMG
Inland Empire Paper, Millwood, Wash.	Late 1991	40,000 ³	40%	45,000	ONP
Kruger, Bromptonville, Que.	May 1991	50,000 ³	var.	65,000	n.a.
North Pacific Paper, Longview, Wash.	Apr. 1991	230,000 ³	var.	200,000	ONP
Smurfit Newsprint, Northeast U.S.	1994+	255,000 ³	100	300,000	ONP and OMG
Stone-Consolidated, Shawinigan, Que.	End 1991	n.a. ³	n.a.	n.a.	n.a.
Proposed					
Abitibi Price, Canada	n.a.	n.a.	n.a.	n.a.	n.a.
Atlantic Packaging, Whitby, Ont.	n.a.	n.a. ²	100	n.a.	n.a.
Bear Island, Ashland, Va.	n.a.	n.a. ³	n.a.	n.a.	n.a.
Boise Cascade, Kenora, Ont.	n.a.	n.a. ³	40	n.a.	n.a.
West Tacoma, Wash.	n.a.	n.a. ³	40	n.a.	n.a.
Donahue, Clermont, Que., or Montreal, Que.	n.a.	85,000 ³	n.a.	n.a.	n.a.
Georgia-Pacific, E. Millinocket, Maine	n.a.	n.a. ²	40	n.a.	n.a.
Golden State, Pomona, Calif.	n.a.	210,000 ³	100	n.a.	n.a.
Newstech Recycling, Vancouver, B.C.	Mid-1991	122,500 ³	n.a.	140,000	ONP
Orford Recycling, Drummondville, Que.	n.a.	120,000 ³	n.a.	n.a.	n.a.
Smurfit Newsprint, Newberg, Ore.	n.a.	275,000 ³	50+	n.a.	n.a.
Westbrook Wood Products, Klamath Falls, Ore.	n.a.	200,000 ³	50	120,000	n.a.

1. Adding deinking capacity does not necessarily mean an increase in papermaking capacity.

2. New paper machines at greenfield or existing mills. 3. New deinking facilities to be added to existing mills.

4. Greenfield market deinked pulp mill.

ONP = Old newspapers. OMG = Old magazines. Var. = variable.

Sources: Canadian Pulp & Paper Assn., Pulp & Paper Week reports.

new 220,000-metric-tpy mill in Claiborne, Ala., that was scheduled to start up July 1. It is a 50:50 joint venture of Parsons & Whittemore Inc. and Abitibi-Price Inc. The latter is running nose-to-nose with Canadian Pacific Forest Products Ltd. for the distinction of being the world's largest newsprint producer. Parsons & Whittemore owns the neighboring Alabama River Pulp Co. Inc. mill in Claiborne, Ala.

Inland Empire's 66,000-tpy, one-machine newsprint mill in Millwood, Wash., is one of the smallest in North America. It is a wholly owned subsidiary of Cowles Publishing Co., which publishes the *Spokesman-Review* and *Spokane Chronicle* newspapers and sells to such newspapers as *The Seattle Times* and the two San Francisco, Calif., dailies.

Another Canadian deinking plant. Abitibi-Price also indicated in July that it would add deinking capacity to one of its newsprint mills in Canada and plans to make a decision on the location by fourth-quarter 1990. "We are committed to helping solve landfill problems in North America," said Bernd Koken, chairman and CEO of Abitibi. One knowledgeable source speculated that the Canadian mill most likely to be chosen for a deinking expansion would be the 165,000-tpy Thunder Bay, Ont., newsprint mill because of its proximity to urban supplies of wastepaper. The company indicated that with the Canadian deinking operation, 40% of its rated newsprint capacity would contain recycled fiber.

Abitibi had also announced that later this year a deinking plant will start up at another Abitibi joint-venture mill, Augusta Newsprint Co. The Augusta mill is expected to begin using recycled fiber in September, making it the first North American mill to be retrofitted with deinking capacity, the company said.

Prior to those announcements, a few buds had already appeared. Alberta Newsprint Co. is considering the addition of a deinking plant at its new 220,000-metric-tpy newsprint mill, which is slated to start up this month and use 100% chemi-thermo-mechanical pulp from abundant nearby stands of lodgepole pine, white and black spruce, and trembling aspen. The company said that it may be forced to use recycled fiber to produce 40% recycled-content newsprint as it plans to ship 60% to

65% of its newsprint to the U.S., where recycled newsprint is increasingly being mandated by the states. The deinking facility would produce up to 100,000 tpd of deinked pulp.

Meanwhile, another group in Alberta reportedly is interested in a recycled fiber facility allegedly backed by the Alberta government in the form of C\$20 million in loan guarantees. The plant is expected to process 20,000 to 30,000 tpy of wastepaper into various publication grades, such as newsprint, magazine paper, and office stationery. Tombill Mines Ltd., Toronto, Ont., is said to be considering investing C\$500,000 in the project. The other investors are unknown. ■

ANPA study compares recycled, virgin newsprint

The American Newspaper Publishers Assn. recently indicated that a three-year comparison of recycled newsprint and virgin newsprint found no significant optical or physical differences between them. The trade association expects that a variety of new recycled newsprint products will be developed in the coming years, which should aid further research on quality issues. An ANPA research project is already attempting to define the physical and optical properties of newsprint that affect newspaper printing.

In addition to its newsprint-quality testing, ANPA is also participating in two research projects to improve recycled newsprint production. One is being conducted by the U.S. Dept. of Agriculture's Forest Product Laboratory in Madison, Wis., on dry paper formation. The other is an in-house ANPA experiment with dry deinking, a process that would eliminate the need for water and chemicals to remove ink from old newspapers.

In 1989, ANPA's Technical Dept. tested 1,861 samples of newsprint (15% of which were recycled) from various newsprint mills. The department will increase the number of samples in 1990. Its recent study found that "the number of web breaks traditionally associated with recycled newsprint has been reduced to the point that its performance can be expected to resemble that of virgin newsprint," according to a recent report. — ■

NEWSPRINT

North British Newsprint project back on track

Abitibi-Price Inc. said last month that it had reached a tentative joint-venture agreement with two publisher partners to proceed with construction of the North British Newsprint Ltd. (NBN) 100% recycled-fiber mill in Gartcosh, Scotland, after certain conditions are met. The Daily Telegraph plc and Mirror Group Newspaper Ltd. each agreed to acquire 25% of NBN; Abitibi would hold the remaining 50% ownership and operate the mill.

Conditions of the agreement include updating engineering studies and cost estimates, securing financing, and getting final approval from the three partners' boards of directors. The NBN project was originated by Sterling Fibre, a U.K. wastepaper merchant. Abitibi indicated in August 1989 that it would acquire those plans and build a C\$340-million, 205,000-metric-tpy mill if certain conditions were met. Current estimates put the cost at C\$400 million for a 220,000-metric-tpy mill, with 80% outside financing.

If all goes as planned, construction could begin by first-half 1991 and take two years to complete, according to Abitibi. The mill, which will incorporate washing and flotation technology, is expected to use about 270,000 tpy of old newspapers and old magazines. As part of the NBN acquisition, Abitibi and the two partners would also acquire half of Sterling Fibre's wastepaper division, Sterling Recycling, to handle wastepaper collections. A small portion of thermomechanical pulp purchased from outside sources will also be used in the furnish, with the percentage based on the quality of the wastepaper collected, said an Abitibi spokesperson. Most of the mill's output would be sold in the U.K. and the rest to customers in continental Europe.

"We are looking forward to establishing a newsprint manufacturing presence in the European Community," stated Bernd Koken, Abitibi's chairman and CEO. "What makes the project doubly exciting is that we will have the capability to service our present U.K. customers from either this domestic mill or our existing mills in Canada." This would be the third recycled newsprint project for Abitibi. ■

World Market Pulp Output Up Slightly As Prices Flatten Out, Begin Decline

**Hardwood bleached kraft and mechanical grades make largest gains
as mills turn out 35.07 million tons in 1989, up 0.7% from 1988**

By KELLY H. FERGUSON, Projects Editor

World market pulp output increased to 35.07 million tons in 1989, up approximately 0.7% from 1988, according to *Pulp & Paper International's* 1989 Market Pulp Survey. Bleached softwood kraft (BSK) pulp remained the dominant market pulp grade although output declined slightly, but capacity of bleached hardwood kraft (BHK) pulp is increasing. Mechanical pulps are also making large gains.

North America maintained its lead as the major market pulp producer, turning out 47% of the world's total output (Figure 1). Both the U.S. and Canada will bring new capacity online within the next three years—

Note: All figures in this article are in metric tons. Pulp & Paper International's 1989 Market Pulp Survey, a summary of which is published here, is an 80-page mill-by-mill listing of nearly 300 market pulp mills worldwide, covering production, capacity, export percentage, and brand names used. This survey is priced at \$577 and is available from PPI in Brussels. Telephone: (32-2) 538 6040/telefax: (32-2) 537 5626/telex: 24672 mfp b.

524,000 tons in Canada and 143,000 tons in the U.S. Also, for the first time, the U.S. slightly exceeded Canada in producing salable market pulp, although about half of U.S. production is consumed domestically.

Other major capacity expansions are planned within the next three years in Brazil (505,000 tons), Japan (330,000 tons), Rep. Korea (200,000 tons), Portugal

FIGURE 1: Geographic distribution of world market pulp production, 1989.

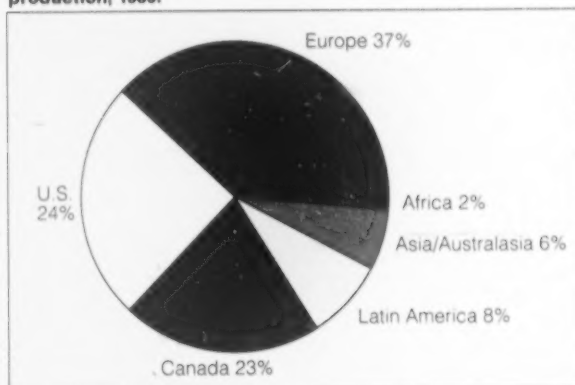


TABLE 1: 1989 market pulp output for selected countries (000 metric tons).

	Sulfate (kraft)	Sulfite	Mechanical	Semi-chemical	Non-wood	Recycled	Total
Canada	6,810	615	736	—	—	—	8,161
U.S.	6,974	1,003	6	—	188	47	8,218
Sweden	2,770	380	544	—	—	—	3,694
Finland	1,704	222	99	—	—	60	2,085
Norway	280	250	264	35	—	—	829
Brazil	1,543	33	11	82	—	—	1,669
Japan	813	159	—	40	—	—	1,012
Portugal	1,121	119	—	—	—	—	1,240
France	643	253	3	—	—	—	899
Spain	693	36	44	—	5	—	778
New Zealand	248	—	100	—	—	—	348
Chile	549	—	—	—	—	—	549
Total	24,148	3,070	1,807	157	193	107	29,482
Total world	27,513	4,555	1,968	360	540	134	35,070

Note: Dissolving included in sulfate and sulfite. Fluff included in sulfate, sulfite and CTMP. Recycled is mainly deinked grades.

TABLE 2: 1989 market pulp exports from major producers (000 metric tons).

Major importers	U.S.	Canada	Sweden	Finland	Norway	Brazil	Total
Europe	1,818	2,269	2,592	1,427	589	318	9,013
U.S.	—	3,394	83	36	—	291	4,344
Canada	141	—	3	—	—	7	151
Asia/Australasia	2,143	2,111	372	186	28	238	5,078
Latin America	457	129	3	1	3	51	644
Africa	43	5	59	31	6	5	149
World total	4,602	8,448	3,112	1,679	620	915	19,384

(108,000 tons), and Spain (120,000 tons).

Based on 1988 market pulp export figures (Table 2), Canada remains the leading exporter, with almost 8.5 million tons shipped. The main importers of Canadian pulp are Europe (2.3 million tons), the U.S. (3.9 million

FIGURE 2: Grade distribution of world market pulp production, 1989.

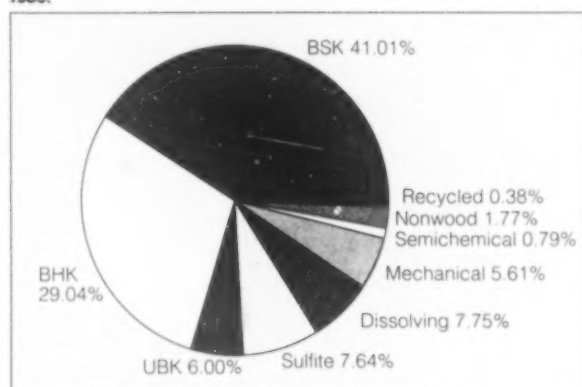
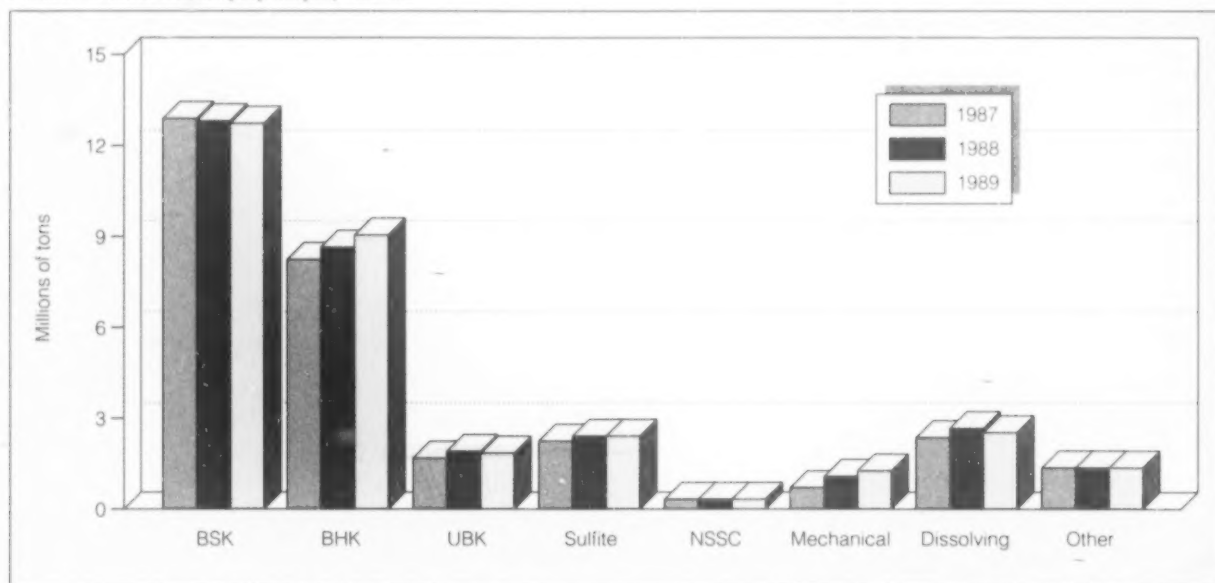


FIGURE 3: World market pulp output, 1987-89.



tons), and Asia/Australasia (2.1 million tons).

The U.S. exported about half of its total market pulp production, shipping 4.6 million tons, with Europe (1.8 million tons) and Asia/Australasia (2.14 million tons) as the main recipients. The 4.6 million tons shipped in 1988 is almost double what the U.S. shipped in 1980 (2.65 million tons), representing a faster growth than any of the other countries listed in Table 2.

Europe is the major importer of market pulp at more than 9 million tons. However, while European imports increased only 4.3% between 1980 and 1988, imports in Asia/Australasia increased 87%—from 2.7 million tons in 1980 to 5.07 million in 1988.

Japan is the major force behind this Asian import boom, importing 1.57 million tons in 1980 but increasing 69.8% to 2.67 million in 1988. Other Asian countries, while importing smaller quantities, still had major increases from 1980 to 1988, including Hong Kong (518%), Rep. Korea (147%), and Taiwan (481%).

HARDWOOD, MECHANICAL MAKE GAINS. While BSK production continued a slight decline (0.3% drop from

TABLE 3: 1989 market pulp output by grade and continent (000 metric tons).

Grade	Europe	North America	Latin America	Asia/Australasia	Africa	Total
BSK ¹	4,244	9,087	763	214	75	14,383
BHK ¹	4,299	3,339	1,402	972	171	10,183
UBK	557	566	407	397	176	2,105
Sulfite ²	2,012	607	33	26	—	2,678
Dissolving	515	1,803	25	157	219	2,719
Semichemical	238	—	—	40	—	278
SGW	547	71	—	—	—	618
RMP/CMP/TMP	150	235	—	10	—	395
CTMP	368	436	61	90	—	955
Nonwood	94	188	110	177	53	622
Recycled ³	87	47	—	—	—	134
Total	13,111	16,379	2,801	2,803	896	35,070

BSK=Bleached softwood kraft (sulfate). BHK=Bleached hardwood kraft (sulfate). UBK=Unbleached kraft (sulfate). SGW=Stone groundwood. RMP=Refiner mechanical pulp. CMP=Chemimechanical pulp. TMP=Thermomechanical pulp. CTMP=Chemi-thermomechanical pulp.

1. Bleached and semibleached. 2. Bleached and unbleached. 3. Mainly deinked grades.

Note: Fluff included in sulfate, sulfite, and CTMP.

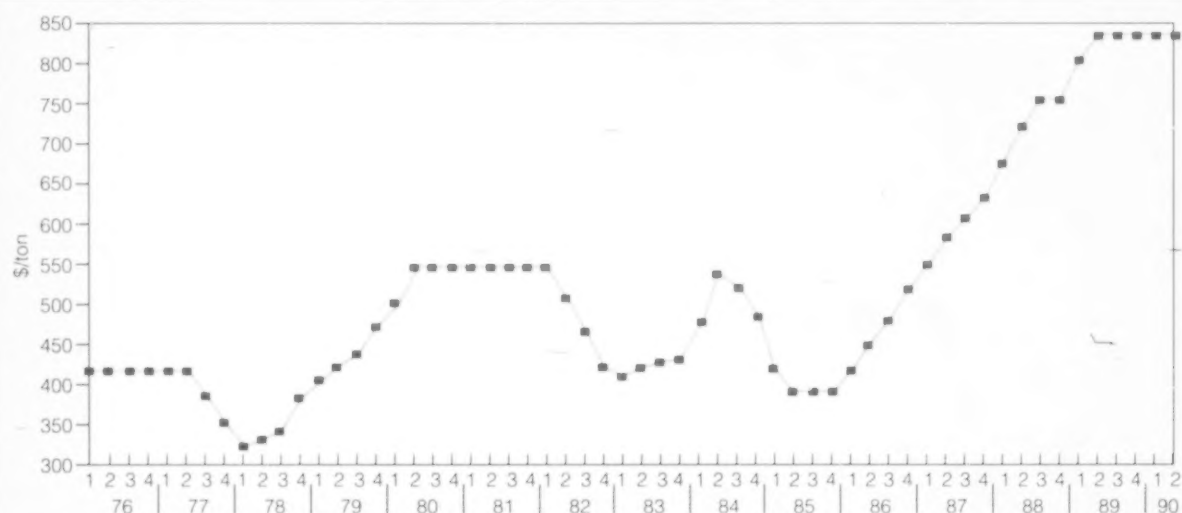
1988 figures), BHK continued modest production gains (3.4% increase from 1988) (Figure 3). These gains are expected to continue because of an estimated 1.5 million tons of new BHK capacity planned for the next three years. However, BSK still maintains a strong hold on total market pulp production at 41% (Figure 2), and 804,000 tons of new capacity are planned for the next three years.

Mechanical grades have also made significant gains from the period between 1987 and 1989, although these grades are only 5.61% of the total market. The boom in mechanical pulp has been led by chemi-thermomechanical pulp (CTMP), which increased 31.7% between 1988

and 1989. Other mechanical grades showing significant increases in the same period were thermomechanical pulp (TMP) with a 21% increase and chemimechanical pulp (CMP) with a 16.7% increase. Europe and North America (mainly Canada) were the leaders in adding new mechanical pulp capacity (Table 3).

As for market pulp pricing, Figure 4 shows that northern bleached softwood kraft (NBSK) prices (US\$/ton) in Northern Europe have leveled out at \$840/ton after a climb that began in first-quarter 1986. However, according to reports in *Pulp & Paper Week*, the current price is unstable and could begin to decline by the end of 1990.

FIGURE 4: Northern bleached softwood kraft price, 1976-89, \$/ton in Northern Europe.



Note: Prices for fourth-quarter 1989 through second-quarter 1990 from *Pulp & Paper Week*.

Mill Clothing Survey Shows Quality Still High While Prices Remain Low

Mills give clothing manufacturers fairly high marks for paper machine clothing quality, while shopping for best bargains possible

By KEN L. PATRICK, Editor in Chief,
and KELLY H. FERGUSON, Projects Editor

A recent *Pulp & Paper* survey of 40 North American paper machines producing eight different grades of paper and board showed, as expected, that the highest average fabric cost per ton of production is in the forming section. Table 1 shows that of those machines reporting, the average cost of forming fabrics was \$1.95/ton of production and that on the same basis pressing and drying costs averaged \$1.51 and \$0.60, respectively.

The typical paper machine in the study (Table 2) was mainly a fourdrinier type (76%), with a 223 in. width, an average speed of 2,243 fpm, and a daily production of 553 tons. The average age was 25 years, and only 26% had been rebuilt since original startup. Although the relatively small number of machines reporting in the various grades may not be statistically significant, the results do indicate typical mill clothing experiences in the forming, pressing, and drying sections of a paper machine.

Responses to the survey came from 13 U.S. states and three Canadian provinces. Those completing the questionnaires were predominantly paper mill superintendents, with a few production managers and other similar

titles. This survey is the first of its kind known to be published in a magazine serving the U.S. and Canadian paper industry. In the future, *Pulp & Paper* will conduct more mill clothing surveys, and it is hoped that next year's study will include at least double the number of this year's participants.

MILL PURCHASING PRACTICES. Surprisingly, surveyed mills reported that they used an average of six different clothing suppliers. The range was three to five suppliers/mill—40%, six to eight/mill—42%, and nine

TABLE 1: Highest fabric costs per ton of production were in the forming section, followed by pressing and drying.

Grade	Forming	Pressing	Drying
Tissue/towel	3.52	3.58	1.40
Coated paper	2.36	1.99	1.01
Specialty paper*	2.35	2.10	0.55
Linerboard	1.65	0.43	0.18
Kraft paper	1.56	1.05	0.19
Market pulp	1.20	0.70	—
Corrugating medium	1.03	0.70	0.24
Newsprint	—	—	—
Total average, \$	1.95	1.51	0.60

1. Includes ledger, forms, offset, Xerox

Grade	Former (%)		Average size (in.)	Average speed (fpm)	Average production (tpd)	Average original startup (year)	Rebuilt (%)
	Fourdrinier	Multiwire					
Tissue/towel	100		135	2,988	68	1957	0
Coated paper	80		214	2,130	463	1970	60
Specialty paper	50	40	280	2,665	537	1981	0
Linerboard	100	50	244	2,100	1,006	1960	65
Kraft paper	100		214	2,059	345	1955	25
Market pulp	100		223	497	967	1962	25
Corrugating medium	100		173	1,708	410	1956	33
Newsprint		100	304	3,800	625	1979	0
Total average	76	24	223	2,243	553	1985	26

TABLE 2: Typical paper machine in the study was a 25-year-old fourdrinier, 233 in. wide, operating at 2,243 fpm to produce 553 tpd.

FIGURE 1: Mills surveyed typically have not changed clothing supplier in the past two years, generally do not single source, and feel that there are currently too many clothing suppliers.

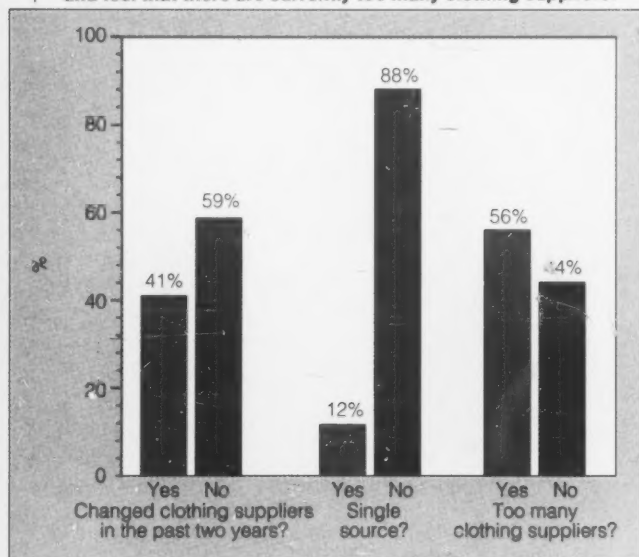
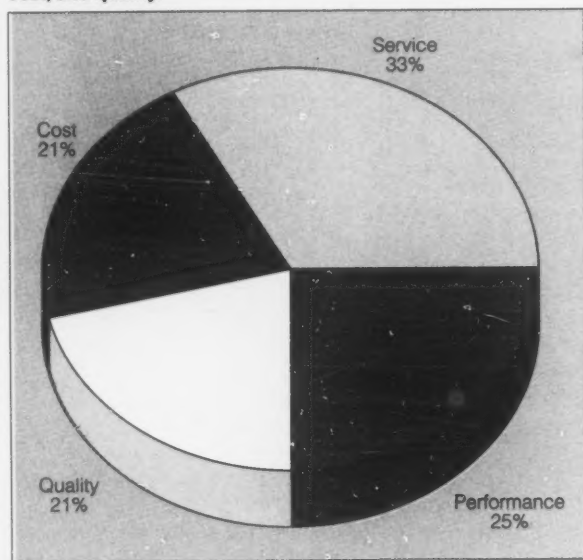
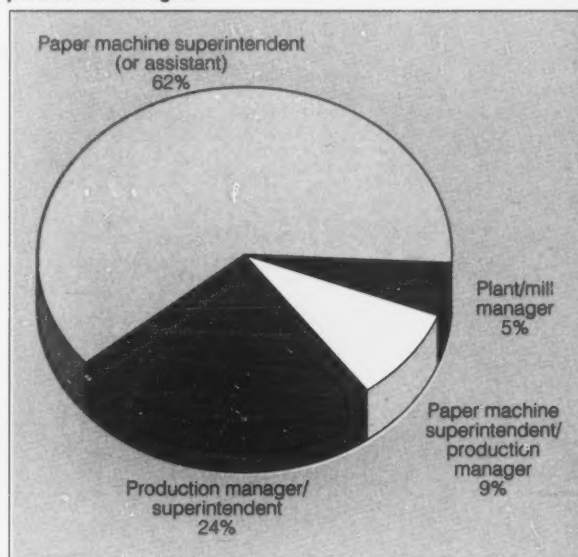


FIGURE 2: Service was listed most often among key mill criteria for selecting paper machine clothing, followed by performance, cost, and quality.



to 11/mill—18%. These figures are particularly interesting when compared with survey responses in Figure 1 showing that few, if any, mills single source (some single source by position), many have changed suppliers in the past two years, and yet most feel that there are currently too many clothing suppliers in North America. Obviously, most mills do a lot of shopping around for clothing, and the more suppliers there are, the better their

FIGURE 3: Who makes clothing purchasing decisions? Most mills reported it was the paper machine superintendent and/or production manager.



chances of finding a bargain.

In selecting clothing suppliers, most mills (33%) listed service as the most important criterion (Figure 2), followed by performance (25%) and quality and cost (both at 21%). As far as who actually buys the clothing, Figure 3 shows that 62% of the mills reported this to be the paper machine superintendent's responsibility (or the responsibility of the superintendent's designated assistant). The production manager or superintendent made clothing purchasing decisions at 24% of the mills, and a combined team of the paper machine superintendent and production manager handled the buying at 9% of the mills. A few mills (5%) said that their clothing was bought by the mill manager.

In answer to the question of how their current clothing costs per ton of production compare with those of two years ago, most mills reported either a decrease (38%) or no change (38%). Only 24% of the mills said that their clothing costs had increased during this period.

In relation to other questions, most (65%) of the mills reported no problem with clothing contamination at their mills. Some 71% said they required their material suppliers to have a statistical process control/statistical quality control (SPC/SQC) program in effect. All respondents agreed that today's clothing suppliers are generally "doing a good job."

FORMING SECTION. The highest cost for forming fabrics, according to the survey, was in tissue/towel grades, at \$3.52/ton of production (Table 1), followed by coated and specialty paper. The less expensive forming fabrics were in the unbleached kraft grades and mar-

TABLE 3: Forming fabrics were of both the single- and double-layer types, but double-layers were predominate in the press machine, as were monofilament fabrics in the dryer.

Grade	Forming			Pressing			Drying			
	Metal	Single layer	Double layer	Single layer	Double layer	Triple layer	Seamed	Endless	Monofilament	Multifilament
Tissue/towel	15	85		32	63	5		100	100	
Coated paper			100		88	14	29	71	82	18
Specialty paper			100		80	20		100	100	
Linerboard		50	50	45	36	19	31	69	85	15
Kraft paper		75	25	11	89		11	89	83	17
Market pulp		75	25	70	20	10	50	50	100	
Corrugating medium		100		50	50		40	60	83	17
Newsprint			100	66	34			100	50	50
Total average	2	48	50	34	57	9	20	80	85	18

ket pulp. Forming fabrics were fairly evenly split between single-layer and double-layer types (48% and 50%, respectively), with a few older tissue machines still using metal wires (Table 3). While coated and fine specialty paper machines tended to use double-layer forming fabrics, the unbleached kraft grades leaned toward single-layers. No fabric costs were shown for newsprint because of the low level of response for this grade.

The average forming fabric life was 92 days (Table 4). Chemical market pulp, with its high grade furnish (generally containing no additives) and relatively slow machine speeds, had the highest average forming fabric life at 185 days, followed by specialty paper (115 days) and kraft boards and paper (97 and 95 days).

PRESS SECTION. The tissue/towel grades, mainly because of their light weights, also pay the highest prices for press fabrics, at \$3.58/ton of production (Table 1). As with forming-fabrics, specialty paper (\$2.10) and coated paper (\$1.99) were next, followed by kraft paper/boards and market pulp at less than a third of the per-ton-of-production costs for tissue.

As Table 3 shows, most press fabrics were double-layer (57%) vs 34% for single-layer wet felts. A few triple-layer laminated press fabrics (9%) were used. None of the coated and specialty paper mills surveyed used single-layer press fabrics, whereas the other grades were fairly evenly split between single- and double-layers. Most mills (80%) reported that they were using endless press felts, but 20%, mainly in the market pulp and unbleached kraft grades, were using seamed felts. Some of the benefits reported for seamed felts included "easier and faster to install, less downtime, improved safety, and less dirty when installing." Reported problems included "seam slap, wear and failure, higher costs than endless design, top roll oscillation, and sheet marking."

In the press section, market pulp again had the longest fabric life (105 days), followed by kraft paper (71 days) and the other grades with approximately the same life span (40 to 50 days) (Table 4). The life of newsprint press fabrics is shown to be very low at only 26 days, but

TABLE 4: Fabric life in the dryer section was an outstanding 307 days, with press fabrics averaging 54 days of operating life.

Grade	Forming	Pressing	Drying
Tissue/towel	63	43	331
Coated paper	73	39	218
Specialty paper	115	47	433
Linerboard	97	57	279
Kraft paper	95	71	288
Market pulp	185	105	500
Corrugating medium	57	41	186
Newsprint	50	26	220
Total average days	92	54	307

again this grade had a low level of response (only two machines).

DRYER SECTION. Dryer fabrics, due to their long average operating life (307 days as shown in Table 4), compared with forming and press fabrics were also the least expensive of fabrics at an average cost of \$0.60/ton of production (Table 1). As expected, tissue and coated paper dryer fabric costs were the highest at \$1.40 and \$1.01/ton of production, respectively. Costs for the kraft brown paper grades averaged only \$0.20/ton of production.

The average dryer fabric life for market pulp machines was an extremely high 500 days, vs only 186 days (unexplainably) for corrugating medium. Specialty paper machines also had long dryer fabric lives (433 days), as did tissue machines (331 days). Most (85%) of the drying sections on the 40 machines surveyed used monofilament fabrics (Table 3), with newsprint being the only grade reportedly using a high percentage of multifilament (50%).

No meaningful conclusions could be made about the use of pin or spiral seams on monofilament fabrics. However, spiral seams were said to be "easier to seam" by some companies and yet more difficult to "fit together" by others. Several mills reported seam failure with spiral seams. Most mills using pin seams reported less sheet marking and improved performance. ■